Claims

1. An isolated nucleic acid molecule selected from the group consisting of:

(a) complements of nucleic acid molecules which hybridize under high stringency conditions to a nucleic acid molecule comprising a nucleotide sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NOs: 1-14 and 97-107 and which code for a sarcoma-associated antigen,

(b) nucleic acid molecules that differ from the nucleic acid molecules of (a) in codon sequence due to the degeneracy of the genetic code, and

(c) complements of (a) or (b).

2. The isolated nucleic acid molecule of claim 1, wherein the isolated nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NOs: 1-14 and 97-107.

3. The isolated nucleic acid molecule of claim 2, wherein the isolated nucleic acid molecule comprises a nucleotide sequence set forth as SEQ ID NO: 10.

4. An isolated nucleic acid molecule selected from the group consisting of:

(a) unique fragments of a nucleotide sequence set forth as SEQ ID NO: 10, which encodes an immunogenic peptide and

(b) complements of (a).

5. An isolated nucleic acid molecule comprising a nucleotide sequence that is at least about 90% identical to a nucleotide sequence selected from the group consisting of SEQ ID NOs: 1-14 and 97-107.

6. The isolated nucleic acid molecule of claim 5, wherein the nucleic acid molecule comprises a nucleotide sequence that is at least about 95% identical.

7. The isolated nucleic acid molecule of claim 5, wherein the nucleic acid molecule comprises a nucleotide sequence that is at least about 97% identical.

8. The isolated nucleic acid molecule of claim 5, wherein the nucleic acid molecule comprises a nucleotide sequence that is at least about 98% identical.

9. The isolated nucleic acid molecule of claim 5, wherein the nucleic acid molecule comprises a nucleotide sequence that is at least about 99% identical.

10. An expression vector comprising the isolated nucleic acid molecule of any of claims 1–9 operably linked to a promoter.

11. An isolated host cell transformed or transfected with the expression vector of claim 10.

12. The isolated host cell of claim 11, wherein the host cell expresses a MHC molecule.

13. The isolated host cell of claim 12, wherein the host cell expresses the MHC molecule recombinantly.

14. An isolated polypeptide encoded by the isolated nucleic acid molecule of any of claims 1-9.

15. The isolated polypeptide of claim 14, wherein the isolated polypeptide has an amino acid sequence selected from the group consisting of amino acid sequences set forth in SEQ ID NOs: 46-60 and 109-120 or a fragment thereof that is at least eight amino acids in length.

16. An isolated binding polypeptide that selectively binds to the isolated polypeptide of claim 14 or 15.

17. The isolated binding polypeptide of claim 16, wherein the binding polypeptide is an antibody or an antigen-binding fragment thereof.

18. A method of diagnosing cancer in a subject comprising:

(a) obtaining a biological sample from the subject, and

(b) determining the presence of an antibody in the biological sample that binds specifically to one or more sarcoma-associated antigens encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 3, 5-8, 10-45, 99, 102, 104 and 108 as an indicator that the subject has cancer.

19. The method of claim 18, wherein the step of determining comprises:

contacting the biological sample with one or more sarcoma-associated antigens that are specifically bound by the antibody and are encoded by a nucleic acid molecule comprising a nucleotide sequence selected from the group consisting of (1) nucleotide sequences set forth as SEQ ID NOs: 3, 5-8, 10-45, 99, 102, 104 and 108 and (2) nucleotide sequences that are at least 90% identical to the nucleotide sequences of (1), and

determining the binding of the antibody to the sarcoma-associated antigen.

20. The method of claim 18, wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NOs: 10, 11, 15, 102, 104 and 108.

21. The method of claim 18, wherein the nucleic acid molecule comprises the nucleotide sequence set forth as SEQ ID NO: 10.

22. The method of claim 19, wherein the sarcoma-associated antigen comprises a polypeptide sequence selected from the group consisting of polypeptide sequences set forth as SEQ ID NOs: 48, 50-53, 55-90, 111, 114, 116 and 120 or a fragment thereof that is at least eight amino acids in length.

23. The method of claim 19, wherein the sarcoma-associated antigen comprises the polypeptide sequence set forth as SEQ ID NO: 55 or a fragment thereof that is at least eight amino acids in length.

24. The method of claim 18, wherein the biological sample is serum.

25. The method of claim 19, wherein the one or more sarcoma-associated antigens are produced recombinantly.

26. The method of claim 19, wherein the one or more sarcoma-associated antigens are bound to a substrate.

27. The method of claim 19, wherein determining the binding of the antibody with the one or more sarcoma-associated antigens is performed with an ELISA-based method.

27. A method for diagnosing cancer in a subject comprising:

obtaining a biological sample from a subject, and

determining the expression of a sarcoma-associated antigen or a nucleic acid molecule that encodes it, wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NOs: 3, 5-8, 10-45, 99, 102, 104 and 108 in the biological sample,

wherein the expression of the sarcoma-associated antigen or the nucleic acid molecule that encodes it in the sample is diagnostic for cancer in the subject.

28. The method of claim 27, wherein the sarcoma-associated nucleic acid molecule comprises the nucleotide sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NOs: 10, 11, 15, 102, 104 and 108.

29. The method of claim 27, wherein the sarcoma-associated nucleic acid molecule comprises the nucleotide sequence set forth as SEQ ID NO: 10.

30. The method of claim 27, wherein the sarcoma-associated antigen comprises a polypeptide sequence selected from the group consisting of polypeptide sequences set forth as SEQ ID NOs: 48, 50-53, 55-90, 111, 114, 116 and 120 or a fragment thereof that is at least eight amino acids in length.

31. The method of claim 27, wherein the sarcoma-associated antigen comprises a polypeptide sequence set forth as SEQ ID NOs: 55 or a fragment thereof that is at least eight amino acids in length.

32. The method of claim 27, wherein determining the expression of the sarcoma-associated antigen or the nucleic acid molecule that encodes it comprises contacting the biological sample with an agent that selectively binds to the sarcoma-associated antigen or the nucleic acid molecule that encodes it.

33. The method of claim 32, wherein the agent that selectively binds is a nucleic acid molecule.

34. The method of claim 33, wherein the expression of the sarcoma-associated nucleic acid molecule is determined by nucleic acid hybridization or nucleic acid amplification.

35. The method of claim 34, wherein the nucleic acid amplification is real-time RT-PCR or RT-PCR.

36. The method of claim 34, wherein the nucleic acid hybridization is performed using a nucleic acid microarray.

37. The method of claim 32, wherein the agent that selectively binds is a polypeptide.

38. The method of 37, wherein the polypeptide is an antibody or antigen-binding fragment thereof.

39. The method of claim 38, wherein the antibody is a monoclonal antibody.

40. The method of claim 39, wherein the antibody is a chimeric, human, or humanized antibody.

41. The method of claim 38, wherein the antibody is a single chain antibody.

42. The method of claim 38, wherein the antigen-binding fragment is a $F(ab')_2$, Fab, Fd, or Fv fragment.

43. The method of claim 38, wherein the antibody or antigen-binding fragment is labeled with a detectable label.

44. The method of claim 43, wherein the detectable label is a fluorescent or radioactive label.

45. The method of claim 27, wherein the sample is selected from the group consisting of: tissue, cells, and blood.

46. The method of claim 27, wherein the cancer is a sarcoma.

47. A method for determining onset, progression, or regression, of cancer in a subject comprising:

obtaining from a subject a first biological sample,

determining the expression of a sarcoma-associated antigen or the nucleic acid molecule that encodes it in the first sample, wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of (1) nucleotide sequences set forth as SEQ ID NOs: 3, 5-8, 10-45, 99, 102, 104 and 108 and (2) nucleotide sequences that are at least 90% identical to the nucleotide sequences of (1),

obtaining from the subject a second biological sample,

determining the expression of the sarcoma-associated antigen or the nucleic acid molecule that encodes it in the second sample, and

comparing the expression in the first sample to the expression in the second sample as a determination of the onset, progression, or regression of the cancer.

48. The method of claim 47, wherein the nucleic acid molecule that encodes the sarcoma-associated antigen comprises the nucleotide sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NO: 10, 11, 15, 102, 104 and 108.

49. The method of claim 47, wherein the nucleic acid molecule that encodes the sarcoma-associated antigen comprises the nucleotide sequence set forth as SEQ ID NO: 10.

50. The method of claim 47, wherein the sarcoma-associated antigen comprises a polypeptide sequence selected from the group consisting of polypeptide sequences set forth as SEQ ID NOs: 48, 50-53, 55-90, 111, 114, 116 and 120 or a fragment thereof that is at least eight amino acids in length.

51. The method of claim 47, wherein the sarcoma-associated antigen comprises a polypeptide sequence set forth as SEQ ID NO: 55 or a fragment thereof that is at least eight amino acids in length.

52. The method of claim 47, wherein the expression of the nucleic acid molecule that encodes the sarcoma-associated antigen is determined by nucleic acid hybridization or nucleic acid amplification.

53. The method of claim 52, wherein the nucleic acid amplification is real-time RT-PCR or RT-PCR.

54. The method of claim 52, wherein the nucleic acid hybridization is performed using a nucleic acid microarray.

55. The method of claim 47, wherein determining the expression of the sarcoma-associated antigen or the nucleic acid molecule that encodes it comprises contacting the biological sample with an agent that selectively binds to the sarcoma-associated antigen or the nucleic acid molecule that encodes it.

56. The method of claim 55, wherein the agent that selectively binds is a polypeptide.

57. The method of 56, wherein the polypeptide is an antibody or antigen-binding fragment thereof.

58. The method of claim 57, wherein the antibody is a monoclonal antibody.

59. The method of claim 57, wherein the antibody is a chimeric, human, or humanized antibody.

60. The method of claim 57, wherein the antibody is a single chain antibody.

61. The method of claim 57, wherein the antigen-binding fragment is a $F(ab')_2$, Fab, Fd, or Fv fragment.

62. The method of claim 47, wherein the sample is selected from the group consisting of: tissue, cells, and blood.

63. The method of claim 47, wherein the cancer is a sarcoma.

64. A kit for detecting antibodies reactive to a sarcoma-associated antigen in a biological sample, comprising:

one or more sarcoma-associated antigens encoded by a nucleic acid molecule comprising a nucleotide sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NOs: 3, 5-8, 10-45, 99, 102, 104 and 108, and

instructions for the use of the sarcoma-associated antigens in the detection of antibodies in the biological sample.

65. The kit of claim 64, wherein the sarcoma-associated nucleic acid molecule comprises the nucleotide sequence set forth as SEQ ID NO: 10.

66. The kit of claim 64, wherein the sarcoma-associated antigens are bound to a substrate.

67. The kit of claim 64, further comprising a labeling reagent and labeling reagent substrate.

68. The kit of claim 64, further comprising a blocking reagent.

69. A kit for the diagnosis of cancer in a subject, comprising:

one or more binding agents that specifically bind to a sarcoma-associated antigen or the nucleic acid molecule that encodes it, wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of nucleotide sequences set forth as

SEQ ID NOs: 3, 5-8, 10-45, 99, 102, 104 and 108 and instructions for the use of the binding agents in the diagnosis of cancer.

70. The kit of claim 69, wherein the one or more binding agents are nucleic acid molecules.

71. The kit of claim 69, wherein the one or more binding agents are polypeptides.

72. The kit of claim 71, wherein the polypeptides are antibodies or antigen-binding fragments thereof.

73. The kit of claim 69, wherein the one or more agents are bound to a substrate.

74. The kit of claim 69, further comprising one or more agents that bind specifically to a cancer-associated antigen other than those encoded by a nucleic acid molecule comprising a nucleotide sequence selected from the group consisting of SEQ ID NOs: 10, 11, 15, 102, 104 and 108.

75. The kit of claim 69, wherein the cancer is a sarcoma.

76. A method for treating a subject with a disorder characterized by the aberrant expression of a sarcoma-associated antigen or the nucleic acid molecule that encodes it comprising:

administering to a subject an effective amount of an antibody or antigen-binding fragment thereof that specifically binds to the sarcoma-associated antigen which comprises the polypeptide sequence selected from the group consisting of polypeptide sequences set forth as SEQ ID NOs: 48, 50-53, 55-90, 111, 114, 116 and 120 or a fragment thereof that is eight or more amino acids in length.

77. The method of claim 76, wherein the antibody or antigen-binding fragment thereof specifically binds to the extracellular domain of the sarcoma-associated antigen which comprises the polypeptide sequence set forth as SEQ ID NO: 55 or a fragment thereof that is eight or more amino acids in length.

78. The method of claim 76, wherein the disorder is cancer.

79. The method of claim 78, wherein the cancer is a sarcoma.

80. The method of claim 76, wherein the antibody is a monoclonal antibody.

81. The method of claim 80, wherein the antibody is a chimeric, human, or humanized antibody.

82. The method of claim 76, wherein the antibody is a single chain antibody.

83. The method of claim 76, wherein the antigen-binding fragment is a $F(ab')_2$, Fab, Fd, or Fv fragment.

84. The method of claim 76, wherein the antibody or antigen-binding fragment thereof is bound to a cytotoxic agent.

85. The method of claim 84, wherein the cytotoxic agent is selected from the group consisting of: calicheamicin, esperamicin, methotrexate, doxorubicin, melphalan, chlorambucil, ARA-C, vindesine, mitomycin C, cisplatinum, etopside, bleomycin and 5-fluorouracil.

86. The method of claim 76, wherein the cytotoxic agent is a radioisotope.

87. The method of claim 86, wherein the radioisotope emits α radiation.

88. The method of claim 86, wherein the radioisotope emits β radiation.

89. The method of claim 86, wherein the radioisotope emits γ radiation.

90. The method of claim 86, wherein the radioisotope is selected from the group consisting of: ^{225}Ac, ^{211}At, ^{212}Bi, ^{213}Bi, ^{186}Rh, ^{188}Rh, ^{177}Lu, ^{90}Y, ^{131}I, ^{67}Cu, ^{125}I, ^{123}I, ^{77}Br, ^{153}Sm, ^{166}Bo, ^{64}Cu, ^{212}Pb, ^{224}Ra and ^{223}Ra.

91. A method for treating a subject with a disorder characterized by the aberrant expression of a sarcoma-associated antigen or a nucleic acid molecule that encodes it, comprising:

administering an amount of an agent that selectively binds to the sarcoma-associated antigen or the nucleic acid molecule that encodes it effective to treat the disorder,

wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of:

(a) an isolated nucleic acid molecule comprising a nucleotide sequence that is at least 90% identical to the nucleotide sequence selected from the group consisting of SEQ ID NOs: 3, 5-8, 10-45, 99, 102, 104 and 108, and

(b) nucleic acid molecules that differ from the nucleic acid molecules of (a) in codon sequence due to the degeneracy of the genetic code.

92. The method of claim 91, wherein the disorder is cancer.

93. The method of claim 92, wherein the cancer is a sarcoma.

94. The method of claim 91, wherein the sarcoma-associated nucleic acid molecule comprises the nucleotide sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NOs: 10, 11, 15, 102, 104 and 108.

95. The method of claim 91, wherein the sarcoma-associated nucleic acid molecule comprises the nucleotide sequence set forth as SEQ ID NO: 10.

96. The method of claim 91, wherein the sarcoma-associated nucleic acid molecule codes for a sarcoma-associated antigen which comprises the polypeptide sequence selected from the group consisting of polypeptide sequences set forth as SEQ ID NOs: 48, 50-53, 55-90, 111, 114, 116 and 120 or a fragment thereof that is at least eight amino acids in length.

97. The method of claim 91, wherein the sarcoma-associated nucleic acid molecule codes for a sarcoma-associated antigen which comprises the polypeptide sequence set forth as SEQ ID NO: 55 or a fragment thereof that is at least eight amino acids in length.

98. The method of claim 91, wherein the binding agent is an antisense or RNAi molecule.

99. The method of claim 91, wherein the binding agent is a polypeptide.

100. The method of claim 99, wherein the polypeptide is an antibody or antigen-binding fragment thereof.

101. The method of claim 99, wherein the antibody is a monoclonal antibody.

102. The method of claim 99, wherein the antibody is a chimeric, human, or humanized antibody.

103. The method of claim 99, wherein the antibody is a single chain antibody.

104. The method of claim 99, wherein the antigen-binding fragment is a $F(ab')_2$, Fab, Fd, or Fv fragment.

105. The method of claim 99, wherein the antibody is bound to a cytotoxic agent.

106. A method for treating a subject with a disorder characterized by the aberrant expression of a sarcoma-associated antigen or the nucleic acid molecule that encodes it, comprising:

administering to the subject an agent which stimulates an immune response to a sarcoma-associated antigen encoded by a nucleic acid molecule selected from the group consisting of:

an isolated nucleic acid molecule comprising a nucleotide sequence that is at least 90% identical to the nucleotide sequence selected from the group consisting of SEQ ID NOs: 3, 5-8, 10-45, 99, 102, 104 and 108.

107. The method of 106, wherein the disorder is cancer.

108. The method of 107, wherein the cancer is a sarcoma.

109. The method of claim 106, wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NOs: 10, 11, 15, 102, 104 and 108.

110. The method of claim 106, wherein the nucleic acid molecule comprises a nucleotide sequence set forth as SEQ ID NO: 10.

111. The method of claim 106, wherein the sarcoma-associated antigen comprises a polypeptide sequence selected from the group consisting of polypeptide sequences set forths as SEQ ID NO: 48, 50-53, 55-90, 111, 114, 116 and 120 or a fragment thereof that is at least eight amino acids in length.

112. The method of claim 106, wherein the sarcoma-associated antigen comprises a polypeptide sequence set forth as SEQ ID NO: 55 or a fragment thereof that is at least eight amino acids in length.

113. The method of claim 106, wherein the agent which stimulates an immune response is a nucleic acid that encodes a sarcoma-associated antigen operably linked to a promoter for expressing the sarcoma-associated antigen.

114. The method of claim 106, wherein the agent which stimulates an immune response is a polypeptide comprising the sarcoma-associated antigen.

115. The method of claim 106, wherein the agent which stimulates an immune response is a host cell that expresses the sarcoma-associated antigen.

116. The method of claim 115, wherein the host cell also expresses a MHC molecule.

117. The method of claim 114, wherein the agent which stimulates an immune response is a peptide fragment of the sarcoma-associated antigen.

118. The composition of claim 114, wherein the agent is a complex of a peptide fragment of the sarcoma-associated antigen and a MHC molecule.

119. The method of claim 106, wherein the agent further comprises an adjuvant or cytokine.

120. A kit for diagnosing a disorder associated with the aberrant expression of a sarcoma-associated antigen or a nucleic acid molecule that encodes it, comprising:

one or more nucleic acid molecules that hybridize to the nucleic acid molecule that encodes the sarcoma-associated antigen comprising a nucleotide sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NOs: 3, 5-8, 10-45, 99, 102, 104 and 108 under high stringency conditions, and

instructions for the use of the nucleic acid molecules in the diagnosis of a disorder associated with aberrant expression of the sarcoma-associated antigen or the nucleic acid molecule that encodes it.

121. The kit of claim 120, wherein the one or more nucleic acid molecules are detectably labeled.

122. The kit of claim 120, wherein the one or more nucleic acid molecules consist of a first primer and a second primer, wherein the first primer and the second primer are constructed and arranged to selectively amplify at least a portion of a nucleic acid molecule that encodes the sarcoma-associated antigen and comprises a sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NOs: 10, 11, 15, 102, 104 and 108.

123. The kit of claim 120, wherein the nucleic acids are bound to a substrate.

124. The kit of claim 120, wherein the nucleic acid molecule that encodes the sarcoma-associated antigen comprises the nucleotide sequence set forth as SEQ ID NO: 10.

125. A method for identifying a cancer-associated antigen, comprising:

(a) obtaining a biological sample from one or more subjects,

(b) determining the reactivity of the biological sample to one or more known cancer-associated antigens,

(c) using the reactive biological sample from (b) to screen an expression library to determine the presence of cancer-associated antigens reactive with the biological sample, and

(d) isolating a clone that encodes the cancer-associated antigen from the expression library.

126. The method of claim 125, wherein the biological sample is serum.

127. The method of claim 125, wherein the expression library is derived from a tumor.

128. The method of claim 127, wherein the expression library is derived from a tumor cell line.

129. The method of claim 125, further comprising: determining the identity of the cancer-associated antigens identified in (d), wherein the identity of the cancer-associated antigen is determined by DNA sequencing.

130. A composition, comprising:

an agent which stimulates an immune response to a sarcoma-associated antigen encoded by a nucleic acid molecule selected from the group consisting of:

(a) an isolated nucleic acid molecule comprising a nucleotide sequence that is at least 90% identical to the nucleotide sequence selected from the group consisting of SEQ ID NOs: 3, 5-8, 10-45, 99, 102, 104 and 108, and

(b) nucleic acid molecules that differ from the nucleic acid molecules of (a) in codon sequence due to the degeneracy of the genetic code.

131. The composition of claim 130, wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NOs: 10, 11, 15, 102, 104 and 108.

132. The composition of claim 130, wherein the nucleic acid molecule comprises a nucleotide sequence set forth as SEQ ID NO: 10.

133. The composition of claim 130, wherein the sarcoma-associated antigen comprises a polypeptide sequence selected from the group consisting of SEQ ID NOs: 48, 50-53, 55-90, 111, 114, 116 and 120 or a fragment thereof that is at least eight amino acids in length.

134. The composition of claim 130, wherein the sarcoma-associated antigen comprises a polypeptide sequence set forth as SEQ ID NO: 55 or a fragment thereof that is at least eight amino acids in length.

135. The composition of claim 130, wherein the agent is a nucleic acid that encodes a sarcoma-associated antigen operably linked to a promoter for expressing the sarcoma-associated antigen.

136. The composition of claim 130, wherein the agent is a polypeptide comprising the sarcoma-associated antigen.

137. The composition of claim 130, wherein the agent is a host cell that expresses the sarcoma-associated antigen.

138. The composition of claim 137, wherein the host cell also expresses a MHC molecule.

139. The composition of claim 136, wherein the agent is a complex of a peptide derived from the sarcoma-associated antigen and a MHC molecule.

140. The composition of claim 130, further comprising an adjuvant or cytokine.

141. The composition of claim 130, further comprising a cytotoxic or chemotherapeutic agent.

142. The composition of claim 130, further comprising a pharmaceutically acceptable carrier.

143. A composition, comprising:

an agent which selectively binds to a sarcoma-associated antigen or a nucleic acid molecule that encodes it, wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of:

(a) an isolated nucleic acid molecule comprising a nucleotide sequence that is at least 90% identical to the nucleotide sequence selected from the group consisting of SEQ ID NOs: 3, 5-8, 10-13, 99, 102 and 104, and

(b) nucleic acid molecules that differ from the nucleic acid molecules of (a) in codon sequence due to the degeneracy of the genetic code.

144. The composition of claim 143, wherein the nucleic acid molecule that encodes the sarcoma-associated antigen comprises a nucleotide sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NOs: 10, 11, 102 and 104.

145. The composition of claim 143, wherein the nucleic acid molecule that encodes the sarcoma-associated antigen comprises a nucleotide sequence set forth as SEQ ID NO: 10.

146. The composition of claim 143, wherein the sarcoma-associated antigen comprises the polypeptide sequence SEQ ID NO: 55 or a fragment thereof that is at least eight amino acids in length.

147. The composition of claim 143, wherein the agent that selectively binds is a nucleic acid.

148. The composition of claim 143, wherein the agent that selectively binds is a polypeptide.

149. The composition of claim 148, wherein the polypeptide is an antibody or antigen-binding fragment thereof.

150. The composition of claim 149, wherein the antibody is a monoclonal antibody.

151. The composition of claim 150, wherein the antibody is a chimeric, human, or humanized antibody.

152. The composition of claim 149, wherein the antibody is a single chain antibody.

153. The composition of claim 149, wherein the antigen-binding fragment is a $F(ab')_2$, Fab, Fd, or Fv fragment.

154. The composition of claim 149, wherein the antibody or antigen-binding fragment is conjugated to cytotoxic or chemotherapeutic agent.

155. The composition of claim 143, further comprising a cytotoxic or chemotherapeutic agent.

156. The composition of claim 143, further comprising a pharmaceutically acceptable carrier.

157. The isolated nucleic acid molecule of claim 2, wherein the isolated nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of nucleotide sequences as set forth as SEQ ID NOs: 121, 123, 125, 127, 129 or 131.

158. The isolated nucleic acid molecule of claim 4, wherein the unique fragment has a nucleotide sequence selected from the group consisting of nucleotide sequences set forth as SEQ ID NOs: 121, 123, 125, 127, 129 and 131, which encodes an immunogenic peptide and

(b) complements of (a).

159. The method of claim 21, wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of nucleotide sequences as set forth as SEQ ID NOs: 121, 123, 125, 127, 129 and 131.

160. The method of claim 23, wherein the sarcoma-associated antigen comprises a polypeptide sequence selected from the group consisting of polypeptide sequences set forth

as SEQ ID NOs: 122, 124, 126, 128, 130 and 132 or a fragment thereof that is at least eight amino acids in length.

161. The method of claim 29, wherein the sarcoma-associated nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of nucleotide sequences as set forth as SEQ ID NOs: 121, 123, 125, 127, 129 or 131.

162. The method of claim 31, wherein the sarcoma-associated antigen comprises a polypeptide sequence selected from the group consisting of polypeptide sequences set forth as SEQ ID NOs: 122, 124, 126, 128, 130 and 132 or a fragment thereof that is at least eight amino acids in length.

163. The method of claim 49, wherein the nucleic acid molecule that encodes the sarcoma-associated antigen comprises a nucleotide sequence selected from the group consisting of nucleotide sequences as set forth as SEQ ID NOs: 121, 123, 125, 127, 129 or 131.

164. The method of claim 51, wherein the sarcoma-associated antigen comprises a polypeptide sequences selected from the group consisting of polypeptide sequences set forth as SEQ ID NOs: 122, 124, 126, 128, 130 and 132 or a fragment thereof that is at least eight amino acids in length.

165. The kit of claim 65, wherein the sarcoma-associated nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of nucleotide sequences as set forth as SEQ ID NOs: 121, 123, 125, 127, 129 or 131.

166. The method of claim 77, wherein the antibody or antigen-binding fragment thereof specifically binds to the extracellular domain of the sarcoma-associated antigen which comprises a polypeptide sequence selected from the group consisting of polypeptide sequences set forth as SEQ ID NOs: 122, 124, 126, 128, 130 and 132 or a fragment thereof that is at least eight amino acids in length.

167. The method of claim 95, wherein the sarcoma-associated nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of nucleotide sequences as set forth as SEQ ID NOs: 121, 123, 125, 127, 129 or 131.

168. The method of claim 97, wherein the sarcoma-associated nucleic acid molecule codes for a sarcoma-associated antigen which comprises a polypeptide sequences selected from the group consisting of polypeptide sequences set forth as SEQ ID NOs: 122, 124, 126, 128, 130 and 132 or a fragment thereof that is at least eight amino acids in length.

169. The method of claim 110, wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of nucleotide sequences as set forth as SEQ ID NOs: 121, 123, 125, 127, 129 or 131.

170. The method of claim 112, wherein the sarcoma-associated antigen comprises a polypeptide sequences selected from the group consisting of polypeptide sequences set forth as SEQ ID NOs: 122, 124, 126, 128, 130 and 132 or a fragment thereof that is at least eight amino acids in length.

171. The kit of claim 124, wherein the nucleic acid molecule that encodes the sarcoma-associated antigen comprises a nucleotide sequence selected from the group consisting of nucleotide sequences as set forth as SEQ ID NOs: 121, 123, 125, 127, 129 or 131.

172. The composition of claim 132, wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of nucleotide sequences as set forth as SEQ ID NOs: 121, 123, 125, 127, 129 or 131.

173. The composition of claim 134, wherein the sarcoma-associated antigen comprises a polypeptide sequences selected from the group consisting of polypeptide sequences set forth as SEQ ID NOs: 122, 124, 126, 128, 130 and 132 or a fragment thereof that is at least eight amino acids in length.

174. The composition of claim 145, wherein the nucleic acid molecule that encodes the sarcoma-associated antigen comprises a nucleotide sequence selected from the group

consisting of nucleotide sequences as set forth as SEQ ID NOs: 121, 123, 125, 127, 129 or 131.

175. The composition of claim 146, wherein the sarcoma-associated antigen comprises a polypeptide sequences selected from the group consisting of polypeptide sequences set forth as SEQ ID NOs: 122, 124, 126, 128, 130 and 132 or a fragment thereof that is at least eight amino acids in length.

176. A method for treating a subject with a disorder characterized by the aberrant expression of a sarcoma-associated antigen or the nucleic acid molecule that encodes it comprising:

administering to a subject an effective amount of an antibody or antigen-binding fragment thereof that specifically binds to the sarcoma-associated antigen which comprises a polypeptide sequence set forth as SEQ ID NO: 134 or a fragment thereof that is eight or more amino acids in length.

177. A method for treating a subject with a disorder characterized by the aberrant expression of a sarcoma-associated antigen or a nucleic acid molecule that encodes it, comprising:

administering an amount of an agent that selectively binds to the sarcoma-associated antigen or the nucleic acid molecule that encodes it effective to treat the disorder,

wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of:

(a) an isolated nucleic acid molecule comprising a nucleotide sequence that is at least 90% identical to the nucleotide sequence selected of SEQ ID NO: 133, and

(b) nucleic acid molecules that differ from the nucleic acid molecules of (a) in codon sequence due to the degeneracy of the genetic code.

178. A method for treating a subject with a disorder characterized by the aberrant expression of a sarcoma-associated antigen or the nucleic acid molecule that encodes it, comprising:

administering to the subject an agent which stimulates an immune response to a sarcoma-associated antigen encoded by a nucleic acid molecule selected from the group consisting of:

an isolated nucleic acid molecule comprising a nucleotide sequence set forth s SEQ ID NO: 133.

179. A composition, comprising:

an agent which stimulates an immune response to a sarcoma-associated antigen encoded by a nucleic acid molecule selected from the group consisting of:

(a) an isolated nucleic acid molecule comprising a nucleotide sequence that is at least 90% identical to the nucleotide sequence set forth as SEQ ID NO: 133, and

(b) nucleic acid molecules that differ from the nucleic acid molecules of (a) in codon sequence due to the degeneracy of the genetic code.